



## Case Report

# A successful team treatment for left main shock syndrome

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## Abstract

Acute myocardial infarction complicated by cardiogenic shock and left main coronary artery disease is called left main shock syndrome. It is reported that the morbidity and mortality of the syndrome is approximately 0.46% and 55%–80%, respectively. However, the best treatment strategy in these cases is unknown. In this article, we present a patient with LMSS who successively underwent emergency percutaneous coronary intervention and coronary artery bypass grafting with hemodynamic support within 5 days. The patient is now on his three month uneventful out-patient follow-up.

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## 1 Introduction

Acute myocardial infarction (AMI) complicated by cardiogenic shock and left main coronary artery (LMCA) disease is called left main shock syndrome (LMSS). It is reported that the morbidity and mortality of the syndrome is approximately 0.46% and 55%–80%, respectively.<sup>[1]</sup>

However, the best treatment strategy in these cases is unknown. In this article, we present a patient with LMSS who successively underwent emergency percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) with hemodynamic support within 5 days. The patient is now on his three month uneventful out-patient follow-up.

## 2 Case report

A 59 year-old male was admitted to our hospital experiencing recurrent chest pain for 6 years and severe pain for 10 h. He had been smoking for seven years and had prior 5 years history of hypertension (160/90 mmHg). On physical examination, the patient was clammy and normal blood pressure (115/60 mmHg), with normal heart sounds and bilateral pulmonary rales on the lower zone of lungs. His electrocardiogram demonstrated ST segment elevation in

leads I, aVL, aVR, V1 through V4, ST segment depression in lead II, III and aVF (Figure 1). Chest X ray indicated a minor increase in pulmonary markings. Acute anteroseptal and lateral myocardial infarction (Killip Class II) and hypertension were diagnosed and the patient was immediately transferred to the catheterization laboratory from the emergency unit. 300 mg aspirin, 600 mg loading dose of clopidogrel and 5000 U of intravenous heparin were administered.

As soon as the coronary angiography was performed, the blood pressure of the patient had dropped to 80/50 mmHg with dyspnea. Coronary angiography disclosed a left main occlusion in the middle portion of its body and a severe stenosis at the proximal posterior descending artery of right coronary artery (Figure 2).

We decided to perform PCI on LMCA. At first, intra-aortic balloon pump (IABP) was inserted and the blood pressure was increased to 95/50 mmHg, except for severe hypoxemia. So an extracorporeal membrane oxygenation machine (ECMO) was inserted via left femoral venoarterial access. The blood pressure was increased to 105/50 mmHg after a while. After one coronary soft guide wire (0.014 inch run through; teromo, Japan) had been passed into the left anterior descending (LAD) coronary arteries, the distal left main portion and LAD was predilatated with 1.5 × 15 mm balloon inflated at 16 atm. Subsequently, LAD was dilated with SPRINTER 2.0 × 12 mm balloon inflated at 14 atm and a FIRE STAR 2.5 × 15 mm balloon inflated at 14 atm. Distally to this lesion with Thrombolysis In Myocardial Infarction (TIMI) grade 3 flow, both LAD and diagonal

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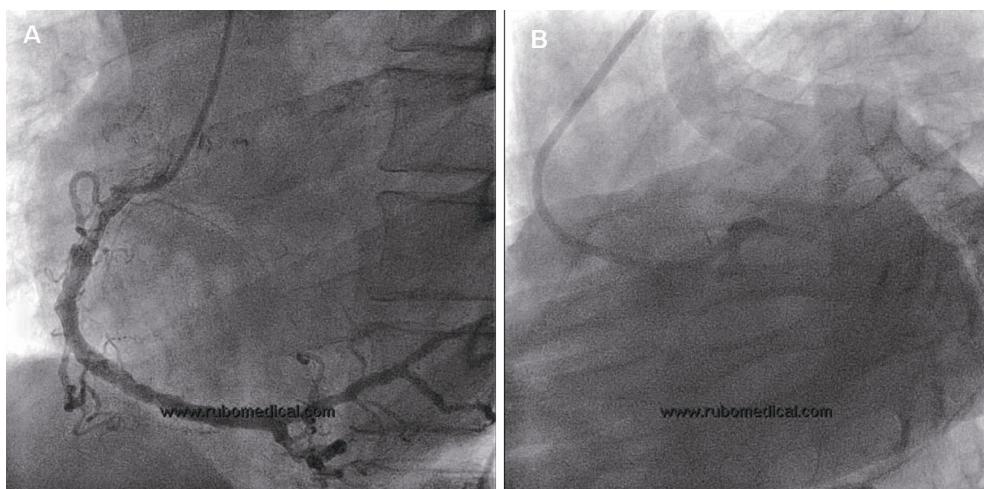
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**Figure 1. Electrocardiogram of a patient with left main shock syndrome.** It demonstrated ST segment elevation in leads I, aVL, aVR, V1 through V4 and ST segment depression in lead II, III and aVF.



**Figure 2. Coronary artery angiographs of a patient with left main shock syndrome.** (A): Right coronary artery angiograph shows a severe stenosis at the proximal posterior descending artery; (B): Angiograph of left coronary artery viewed from spider position shows a left main occlusion in the middle portion of its body.

branch presented a significant diffuse lesion while circumflex (CX) ostia presenting with coronary aneurysm (Figure 3). Therefore, we ended the procedure.

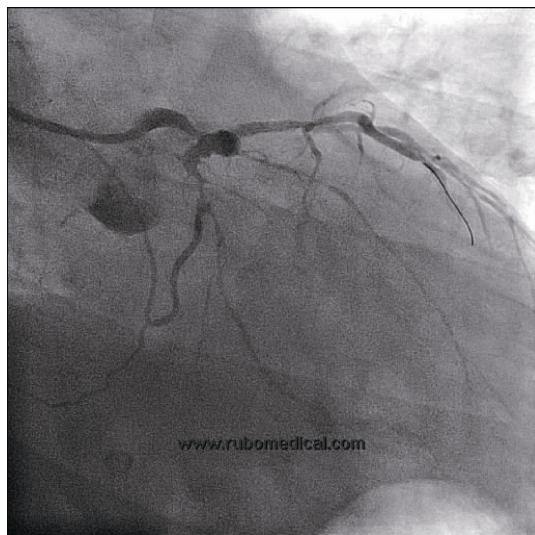
The patient was then monitored in Coronary heart disease Care Unit (CCU) with 3.4 L/min of Extracorporeal Membrane Oxygenation (ECMO) and 1:1 counterpulsation of IABP supporting on the first day after PCI. The total 24 h urine volume increased from 1050 mL of the second day to 3170 mL of the third day after PCI. So the IABP was withdrawn and ECMO volume was turned down to 2.4 L/min.

However, the number of platelets in the whole blood of the patient dropped from 140 G/L on the first day to 76 G/L on the fifth day with normal liver, kidney and blood clot function, a successively CABG (AO-SVG-LAD and AO-

SVG-D1-PDA) was then performed. On the second day after CABG, ECOM was withdrawn successfully. The patient is now on his three month uneventful follow-up.

### 3 Discussion

The European Society of Cardiology for 2012 ST-elevation myocardial infarction guideline recommends emergency revascularization with either PCI or CABG in suitable patients with cardiogenic shock as class I and a level of evidence B.<sup>[2]</sup> However, since LMSS morbidity is so low, we do not know exactly which is better for PCI or CABG treatment and what we should do if IABP does not produce an positive effect in these patients.



**Figure 3. Left coronary artery angiograph after balloon inflation at left main artery in a patient with left main shock syndrome.** Distally to the lesion of the left main, proximal left anterior descending, diagonal branch and proximal circumflex presented significant diffuse lesions while circumflex ostia presenting with coronary aneurysm and TIMI grade 3 flow.

In this case, we selected PCI and succedent CABG treatment strategy based on the following considerations. First, as common strategies of unprotected left main revascularization in ACS, both PCI and CABG were significantly associated with improved discharge and 6 month survival in comparison with no revascularization.<sup>[3]</sup> Second, we encountered LMSS during angiogram in an unexpected way. PCI became more feasible strategy of revascularization in this situation than CABG surgery, which will generally be delayed. Third, it has been TIMI 3 grade flow after balloon inflation in LAD, in which presented a significant diffuse and small vessel distal to coronary aneurysm lesion in LCX. As a previous study indicated, a small lumen diameter before the procedure is the independent predictor of death in patients with cardiogenic shock,<sup>[4]</sup> we performed CABG surgery days later.

Guidelines also suggested IABP with a recommendation class IIb and a level of evidence B as an effective measure in combination with balloon angioplasty in these patients.<sup>[2]</sup> However, There is insufficient evidence endorsing the current guideline recommendation in the setting of LMSS. On the contrary, in the meta-analysis included nine cohorts of ST-Elevation Myocardial Infarction (STEMI) patients with cardiogenic shock ( $n = 10529$ ) treated with PCI, support by IABP was associated with a 6% (95%CI: 3%–10%;  $P < 0.0008$ ) increase in 30 day mortality.<sup>[5]</sup> Whereas, a recent

study indicated that patients who received primary PCI and supported with IABP and ECMO had better 30-day and 1-year survival outcomes than those only with IABP.<sup>[6]</sup> This case also indicated that ECMO should be performed in LMSS in advance. But the difficult decision to withdraw ECMO may need to be made if the patient is not eligible for conventional corrective surgery, or longer term ECMO.<sup>[7]</sup> As observational data concerning IABP or ECMO therapy in the setting of LMSS is importantly hampered by bias and confounding, therefore, randomized controlled trials in the future are needed to determine the use of IABP and ECMO in these patients treated with PCI.

All together, this case has shown that successful team treatments, including the prompt and suitable revascularization strategy, potent IABP and ECMO support are important to improve the clinical outcome in patients with LMSS.

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